University of Technology, Sydney

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The Effect of the Addition of Fulvic Acid and Straw Water on the Efficiency of Arsenic Uptake from Groundwater by *Vetiveria zizanioides*

by

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Statement of Originality

The entire work created in this master's thesis report is a sole work of the author. He has not used any fragment of text from other sources without providing the proper acknowledgement. The theories, results and designs of original work have been appropriately referenced and all sources of assistance have been fully acknowledged.

Zhuang Zhao

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Abstract

The aim of this research project was to investigate the efficiency of fulvic acid or straw water as an amendment to enhance the uptake of arsenic from groundwater by *Vetiveria*. Fulvic acids and straw water were applied to arsenic-contaminated groundwater at different concentrations (0.1% and 0.01%). It was found that when the higher concentration of straw water was added to the groundwater solution, the efficiency of arsenic accumulation by roots was increased 47.8%. Straw water not only enhances the growth of *Vetiveria*, but also improved arsenic accumulation in both shoots and roots. In contrast, the addition of fulvic acids (at high or low concentrations) resulted in the reduction of *Vetiveria* growth. Specifically, a high concentration of fulvic acid reduced arsenic accumulation in roots whilst a low concentration of fulvic acid decreased arsenic accumulation in shoots.

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Table of Contents

List of figures

List of tables

Abbreviations

ADD	Average Daily Dose
As	Arsenic
BF	Bio-concentration Factor
CDTA	Leneditrilotetraacetic Acid
DTPA	Diethylenetriaminepentaacetic Acid
EC	Electrical Conductivity
EDTA	Ethylendiaminetriacetic Acid
EESI	Environmental Earth Science International
EGTA	Ethylene Glycol Tetraacetic Acid
EPA	Environmental Protection Agencies
FH	High concentration of Fulvic Acid 0.1%
FL	Low Level of Fulvic Acid 0.01%
FT	Frist Trial
GW	Groundwater
HEDTA	N-Hydroxyethyl-Ethylenediamine-Triacetic Acid
HI	Hazard Index
ICP-MS	Inductively Coupled Plasma Mass Spectrometry
Maize	*Zea mays*
NOM	Natural Organic Matters
NTA	Nitrilotriacetic Acid
OA	Oleic Acid
PAH's	Polycyclicaromatichydrocarbons
PCB's	Polychlorinatedbiphenyls
PCPs	Pentachlorophenols
RfD	Reference Dose
SF	The Slope Factor
SH	High concentration of Straw Water 0.1%
SL	Low Level of Straw Water 0.01%
SOM	Soil Organic Matter
ST	Second Trial
TF	Translocation Factor
TT	Third Trial
W	Tap Water
WHO	World Health Organization